

B² cont.
that ink leaks from the ink supply port 114 or that air or a bubble enters the ink supply port 114. This means that a user of the ink cartridge cannot remove the ink cartridge until ink in the ink cartridge is completely used up. The user cannot repeatedly exchange a plurality of ink cartridges with his choice while ink still remains in the ink cartridge.

Page 4, line 7.

B³
In the conventional ink cartridge shown and Fig. 28, the packing member 134 serves as a valve seat sealing the ink supply port 132 with the connecting means, and the ball 136 serves as a valve body closing the ink supply port 132 in cooperation with the packing member 134. However, the relative position between the ball 136 and the spring 138 is unstable. This may cause an undesirable insufficient sealing by the ball 136 with the packing member 134. Furthermore, the connecting means needs to have a large contact area to sufficiently urge the ball 136 against the elastic force of the spring. Therefore, the connecting means is not easily inserted in the packing member 134. Furthermore, because the ball 136 is always urged toward the packing member 134 by the spring, the through hole of the packing member 134 may be expanded. This is disadvantageous because it may cause an insufficient connection between the ball 136 and the packing member 134.

Page 5, line 10.

B⁴
The above and other objects can be achieved by combinations of the features recited in independent claims of the present application. Dependent claims define further advantages and exemplary combinations of the present invention.

Page 19, line 14.

B⁵
Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings. The embodiments described as follows are not intended to limit the scope of the present invention, but merely exemplify the invention. Not all of the features and the combinations thereof described in the embodiment are necessarily essential to the invention.

Page 19, beginning at line 21 and extending to page 20.

B⁶
Fig. 1 shows a first embodiment of an ink cartridge according to the present invention. As shown and Fig. 1, an ink cartridge 2 has an ink chamber 4 for containing ink, and an ink supply port 6 designed to establish an ink communication with the ink chamber 4. The ink cartridge 2 is also provided with a packing member 8 disposed within the ink supply port 6, and a valve member 10 located between the ink chamber 4 and the packing member 8. The valve member 10 is always urged toward the packing member 8 by an elastic force of a compression spring 12 (see figure 2). The packing member 8 is made of an elastic material such as a rubber or a plastic. The ink chamber 4 accommodates therein a porous member 5 which absorbs ink. Because of the fact that ink is absorbed in the porous member 5, ink is retained in the ink chamber in a stable manner without splashing, even with the ink cartridge being mounted on a carriage of a printing apparatus reciprocating at a high speed. Since the porous member 5 is accommodated in the ink chamber 4, the ink chamber 4 is always depressurized.

Page 22, line 13.

B⁷
The packing member 8 is press-fitted in the ink supply port 6 and defines an ink introducing chamber 36 within the ink supply port 6. The ink introducing chamber 36 is an area defined between the packing member 8 and the ink chamber 4. The valve member 10 is received in the ink introducing chamber 36. The ink introducing chamber 36 has a cylindrical guide unit 38 having a through bore 38a. The guide unit 38 receives a part of the valve member 10 in order to guide the valve member 10. The guide unit 38 contacts with the part of the valve member 10 necessary to have the valve member 10 moved vertically with respect to the packing member 8. The valve member 10 is always urged by a compression spring 12 toward the packing member 8, to contact with the packing member for selectively closing the ink channel of the packing member 8.

Page 24, line 14.

B⁸
The internal opening 16 formed at the side of the ink supply port 6 opening to the ink chamber 4 has a dimension larger than the dimension of the ink introducing chamber 36 in which the valve member 10 is accommodated. The result is, ink can smoothly be introduced to the ink introducing chamber 36, and can likewise smoothly flow to the ink supply port 6 and the ink chamber 4 of the ink cartridge. A filter 54 is provided between the internal opening 16 of the ink supply port 6 and the ink chamber 4 of the ink cartridge. The filter 54 collects dust or foreign particles existing in the ink chamber 4. Furthermore, as the filter 54 has a dimension the same as that of the internal opening 16, ink passes smoothly through the filter 54.

Page 25, line 15.

B⁹
As shown in Fig. 4(A), the external opening 14 of the ink supply port 6 is adjusted to fit the ink supply needle 104 to have the ink cartridge 2 depressed in the ink cartridge holder 106 of the printing apparatus. The tapered ink supply needle 104 then penetrates the sealing film 56, to be inserted into the fitting portion 28 whilst being guided by the first and second tapered portions 24 and 26 of the packing member 8. When the ink cartridge 2 is further pushed into the cartridge holder 106 of the printing apparatus, the tapered ink supply needle 104 is smoothly inserted into the hole 32 of the packing member 8. This causes the hole 32 to expand, and the fitting portion 28 of the packing member 8 seals the ink supply needle 104 (see figure 4(B)). The ink supply needle 104 urges the flat sealing portion 44 of the valve member 10 upward. At the same time, the valve member 10 moves toward the ink chamber 4 against the elastic force of the compression spring 12.

Page 30, line 6.

B¹⁰
In this embodiment, the valve member 10 is incorporated in the ink supply port 6 by entering the compression spring 12 from the internal opening 16 to be placed around the ink introducing chamber 36. The edge of the guide body 42 having the groove 62 is pushed into the through bore 38a of the guide unit 38. The guide block 52 has a groove 62 which allows the

B¹⁰
cont. guide block 52 to be buckled as it passes through the through bore 38a, and then spreads to be retained in the guide unit 38. In this case, the valve member 10 can be formed as one unit, therefore, the number of parts and working process are reduced.

Page 31, line 20.

B" As for the ink cartridge 2 according to the present invention, the ink of the ink supply port 6 is sealed by the connection between the packing member 8 and the valve member 10. Thus, it is not necessary to close the external opening 14 with a sealing film or any equivalent member thereof. Therefore, as shown in Figs. 13(A) and 13(B), the sealing film 56 provided at the external opening 14 may be formed with a hole 56a which enables the ink supply needle 104 to pass through. The hole may be formed by cutting the film in a cross shape as shown in Fig. 14. By making the hole, the ink supply needle smoothly passes through the film.

IN THE CLAIMS:

Claims 45 and 53-56 are cancelled, without prejudice or disclaimer.

This set of claims is a clean set of pending claims 50-52, consolidating any previous versions of pending claims into this single clean version, with changes made in this response being shown in the Appendix. New claims 57-61 follow.

Sub Q1
B¹² 50. (Amended) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:
an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;
a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith; and

601
cont
a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle;

B12
cont
wherein said first member comprises a protruding member formed on a surface thereof facing the ink chamber, said protruding member contacting the ink supply needle of the printing apparatus and said second member contained in said ink channel.

51. An ink supply system according to claim 50, wherein said first member comprises a hole through which ink flows, said hole being surrounded by said protruding rim, a diameter of said hole is smaller than that of the ink supply needle of the printing apparatus.

52. An ink supply system according to claim 50, wherein said second member comprises a surface facing said first member formed with a convex surface.

New claims 57-61 are added as follows.

57. (New) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:

B13
an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;

a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith;

a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said

second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle; and
a sealing member air-tightly closing said ink channel until said ink channel is open.

58. (New) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:

an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;

a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith; and

a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle;

wherein said second member comprises a surface, facing said packing member, provided with a notch.

59. (New) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:

an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;

a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith; and

Sub. C. Cont.
a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle;

wherein said second member comprises a guide body operably allowing said second member to slide substantially vertically with respect to said packing member.

60. (New) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:

B13 Cont.
an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;

a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith; and

a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle;

wherein said second member comprises a guide rod extending along a direction to the ink chamber, and a guide unit fitting with said second member for allowing said second member to slide along the direction of the sealing of said first member with said second member.

61. (New) An ink supply system for a printing apparatus providing ink to a printing head through a tapered ink supply needle, said ink supply system capable of providing ink contained in an ink chamber to the print head through the ink supply needle, comprising:

Amendment under 37 C.F.R. § 1.111
Application No. 10/054,898
Attorney Docket Q67951

*sub
C.1
broad*

an ink channel for providing ink from said ink chamber to the print head of the printing apparatus;

a first member provided at said ink channel, forming a part of said ink channel for allowing a flow of ink, said first member sealing the ink supply needle of the ink printing apparatus by fitting therewith; and

*B13
cont.*

a second member contained in said ink channel elastically abutting against said first member in a direction which is the same as a direction of the sealing by said first member with said second member, said second member selectively opening and closing said ink channel in conjunction with the ink supply needle;

wherein a direction of said ink channel is substantially the same direction as the direction of the sealing of said first member with said second member.
